UNIBLITZ®
Shutter Systems
1.800.828.6972

# User Manual

## VCM-D1 Shutter Driver

**14-0025**
**Version 3.20**
**2013**

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Version 3.20

2013

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# WARRANTY

LIMITED PRODUCT WARRANTY: All Products manufactured by VINCENT ASSOCIATES® (MANUFACTURER) are warranted to meet published specifications and to be free of defects in materials and workmanship as defined in the specifications for 365 days - one year - (WARRANTY PERIOD) from the date of original shipment of the product. DSS series shutters are additionally warranted to achieve two million cycles within the WARRANTY PERIOD (as defined in the CYCLE WARRANTY CRITERION). MANUFACTURER will, at its own option within the WARRANTY PERIOD, repair or replace without charge any listed item discovered to be defective excepting transportation charges. Burned out or otherwise damaged actuator coils are not covered under this warranty. Any defective product returned to the MANUFACTURER must follow the RETURN MATERIAL AUTHORIZATION PROCEDURE as defined below. This warranty does not extend to cover damage resulting from alteration, misuse, negligence, abuse, normal wear and tear, or accident. The MANUFACTURER will consider the return of unused equipment if returned within 30 days from the original date of shipment, subject to a 20% restocking charge. This offer does not apply to used or damaged equipment. This warranty extends only to the original purchase and is not available to any third party, including any purchaser assemblies or other Products of which the goods may become component equipment.

CYCLE WARRANTY CRITERION: One "cycle" is considered one open and one closure of the shutter. DSS Shutter must be operated with the ED12DSS driver or equivalent H-Bridge type shutter driver circuit at +10.7VDC across the actuator coil for the specified duration. DSS Shutter must be operated within the defined environmental, electrical and mechanical specifications as listed on the device's data sheet. After one year (WARRANTY PERIOD), the cycle warranty is null and void. If returned, the device must be accompanied by a written statement indicating the approximate number of cycles contained on the device, include all parameters to which the shutter was operated and follow the RETURN MATERIAL AUTHORIZATION PROCEDURE as defined below.

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LIMIT OF LIABILITY: The buyer's exclusive remedy and the limit of MANUFACTURER'S liability for any loss whatsoever shall not exceed the purchase price paid by the buyer for the goods to which a claim is made. MANUFACTURER does not give any implied warranties of merchantability, fitness for a particular purpose, or of any other nature in connection with the sale of any Products.

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## General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use the product only as specified.

*Only qualified personnel should perform service procedures.*

### Injury Precautions

- **Use proper Power Cord –** To avoid fire hazard and risk of personal injury use only the power cord supplied with this product.
- **Avoid Electric Overload –** To avoid electrical shock or fire hazard do not apply a voltage to a terminal that is outside the range specified for that terminal.
- **Avoid Electric Shock –** To avoid injury or loss of life, do not connect or disconnect line cord while it is connected to the line voltage.
- **Ground the Product** – This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, the grounding connector must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded. **DO NOT DEFEAT THE GROUND CONNECTION ON THE SUPPLIED LINE CORD.**
- **Access to On/Off Switch** – Due to the location of the unit's On/Off switch on the rear panel, ***do not*** position the unit such that the On/Off switch is difficult to access and operate while installed and in use.
- **Do Not Operate Without Covers** – To avoid electric shock or fire hazard, do not operate this product with case or covers removed.
- **Use Proper Fuse** – To avoid fire hazard, use only the fuse type and rating specified for this product.
- **Do Not operate in Wet/Damp Conditions** – To avoid electric shock, do not operate this product in wet or damp conditions.
- **Do Not Operate in an Explosive Atmosphere** – To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

## Product Damage Precautions

- **Use Proper Power Source** – Do not operate this product from a power source that applies more than the voltage specified.
- **Provide Proper Ventilation –** To prevent product overheating, provide proper ventilation.
- **Do Not Operate with Suspected Failures –** If you suspect there is damage to this product, have it inspected by qualified service personnel.

## Safety Terms and Symbols

These terms appear in this manual

| | |
|---|---|
| **WARNING** | *Warning statements identify conditions or practices that could result in injury or loss of life.* |
| **CAUTION** | *Caution statements identify conditions or practices that could result in damage to this product or other property.* |

These symbols appear on the equipment

ATTENTION – Refer to user manual.

## Avertissements de sécurité

Ces termes et illustrations apparaissent dans le manuel

| | |
|---|---|
| ***AVERTISSEMENT*** | *Le titre AVERTISSEMENT indique une situation où, si l'avertissement est ignoré, de graves blessures ou la mort peuvent en resulter.* |
| ***PRUDENCE*** | *Le titre PRUDENCE indique une situation où, si l'on ne fait pas attention, cela risqué d'entraîner des dommages à l'équipement ou à d'autres propriétés.* |

Ces symboles sont présents sur l'équipement

ATTENTION – Se référer au manuel d'utilisation.

# Preface

This Manual provides information for the **VCM-D1** Shutter Driver. The manual contains the following chapters:

- *Getting Started* contains a brief product description, information needed to power on the drivers, fuse replacement and voltage change information, and a brief procedure to verify that it functions.
- *Operator Controls* provide an outline of the panel control functions and locations at the front and rear panels. This also includes the location and function of the input/output signals.
- *Operating Basics* give further details to the operational features of the controllers.
- *Specifications* are described for all input/output levels as well as timing accuracy of the **VCM-D1 Shutter Driver** including other pertinent details and information required for the RS-232C interface.
- *Index* contains a full index.

*Following is the complete operator's manual for the* ***UNIBLITZ® VCM-D1 Shutter Driver****. Please read this manual completely before operating your unit. Due to the construction of this unit, we recommend that the unit be returned to the manufacturer for repair, no user-serviceable parts inside.*

# Getting Started

## Features

The ***UNIBLITZ®*** **VCM-D1** replaces the **VMM-D1** controller for those customers requiring CE/UL/CSA certification. The **VCM-D1** contains all of the features of the **VMM-D1**. Some new features have been added to enhance the unit's capability in even more demanding applications.

These new features include:

- **RoHS** Compliant
- **UL/CSA** certification and **CE** compliance.
- An addressable RS-232C input through an RJ45 input connector.
  - Eight **VCM-D1** units can be daisy-chained together by connecting the RJ45 output to the RJ45 input of the next controller within the chain.
  - The user can select an address for each unit in the chain at the rear panel.
- Switching capability on all input and output BNC connectors to provide either an active-high or an active-low logic trigger level.
- An AUX (auxiliary) output that can be toggled high to low and low to high by RS-232C commands.
- A GATE INPUT which will allow the user to select single or multiple trigger signals from a stream of trigger signals.
- A LOCAL/REMOTE switch which will effectively disconnect all input signals from the controller allowing the user to manually control the shutter without the need to remove the signals from the BNC inputs or the front panel terminal strip. RS-232C signals are also disabled in the LOCAL position.
- A manually re-configurable AC input module for either 115 VAC or 230 VAC operation. This AC input module includes the AC power cord input receptacle, power switch, dual line fuses, line voltage change over fuse block, and line filter.
- A switch to disable the Electronic Synchronization System of a shutter so-equipped.
- A new SwitchCraft™ locking type shutter output connector.
- Enhanced CONTROL terminal at the front panel which now also includes the +5 VDC and AUX outputs. These were previously located at the rear panel with the VMM-D1. All voltage outputs are internally fuse protected – not user-serviceable.

## Introduction

The ***UNIBLITZ®*** **VCM-D1** is capable of controlling all traditional shutter types in the ***UNIBLITZ*** product line.

It incorporates a state of the art shutter driver while relying on the input signal to determine exposure and frequency.

The **VCM-D1** also permits the selection of an interrupt mode. This mode selection makes the **VCM-D1** more versatile for applications where the shutter must not re-open until acted upon by the user.

- With the MODE switch in the "A" position the unit will disable itself upon an AC line loss.
- When power is restored, the unit will remain disabled until reset.
- In the "B" position the unit will become disabled when a DC voltage level is removed from the interrupt input.
- When the input is restored, the unit will remain disabled until reset.
- The STD mode will bypass the interrupt capability.

The GATE INPUT is used in conjunction with TRIGGER INPUT. This allows the user to *pick* one or a finite number of trigger pulses to trigger the controller from a continuous stream of pulses presented at the TRIGGER INPUT.

The **VCM-D1** contains an addressable RS-232C input along with an RS-232C output. By connecting the RJ45 OUTPUT of one controller to the RJ45 INPUT connector of the next controller in the daisy-chain using the optional 810RJ cable, up to eight units can be individually controlled from one computer serial port.

The **VCM-D1** patented driver design allows the controller to operate all traditional shutter types in the ***UNIBLITZ*** product line.

A model number **710A**, 3 meter, 7-pin Wire-Pro™ female to 5-pin SwitchCraft™ male locking shutter interconnect cable is also included with each unit.

The **VCM-D1** has successfully completed and is certified to **CE/UL/CSA** Safety and EMC certifications. Please refer to the APPLICABLE CERTIFICATIONS section elsewhere in this manual.

## Start Up

After unpacking your unit inspect for any obvious defects and that all manufacturer supplied materials are present.

If a problem is found or a part (or parts) is missing, please contact Vincent Associates immediately for problem resolution. Do not attempt to connect the unit if defects or damage are noted until Vincent Associates has been contacted and the problem resolved.

**CAUTION**

*Be sure the proper line cord is used.*

**PRUDENCE**

*Assurez-vous d'utiliser le cordon d'alimentation approprié.*

Line cords are included with the **VCM-D1** for both Domestic (USA) and Overseas (EU) line connection. If the included EU line cord is not compatible, use a line cord rated for 230VAC, minimum 1 Amp, and 0.75 $mm^2$ minimum conductor size. Maximum cord length is 3 meters.

After the initial inspection, the unit is ready to use. To properly install and power on the **VCM-D1,** perform this procedure:

1. Check for proper electrical connections. Please note the label covering the AC input module, it is there as a reminder to manually configure the AC input module if the unit requires operation at 230 VAC. See **Voltage Change** instructions elsewhere in this manual.

**CAUTION**

*This label must be removed prior to inserting the power cord into the AC input connector regardless of which AC voltage level is used.*

**PRUDENCE**

*Cette étiquette doit être enlevée avant d'insérer le cordon d'alimentation dans le connecteur d'entrée AC, quel que soit le niveau de tension AC utilisé.*

2. Check the line fuses to be sure they are the proper rating. The **VCM-D1** is shipped with the proper fuses for 115 VAC operation (two 3AG, 0.5A time-lag). For 230 VAC operation, change the two line fuses to two 3AG, 0.25A time-lag (supplied). See **Line Fuse Replacement** instructions elsewhere in this manual.

3. Be sure the AC module power switch is selected to the “0” position and the line cord is not connected to the AC line.
4. Connect the supplied line cord to the rear panel AC module receptacle. Be sure the cord is inserted completely into the AC module receptacle.
5. Connect the line cord to the AC line.
6. *Please Note: The* **VCM-D1** *power switch is located on the rear of the case. Please be sure that it is readily accessible at all times when in use.*
7. Power ON the unit by rocking the AC module power switch to the “1” position. Power LED indicator will illuminate.

## Line Fuse Replacement

**WARNING**

*To avoid injury or death, unplug the line cord from the line voltage power source before continuing.*

**AVERTISSEMENT**

*Pour éviter les risques de blessures ou de mort, débranchez le cordon d'alimentation de la source de tension avant de débuter cette précédure.*

1. A small flat-bladed screwdriver or similar tool is needed to complete this procedure. Please refer to Figure 1.
2. **BE SURE THE LINE CORD IS DISCONNECTED FROM THE LINE VOLTAGE POWER SOURCE. DO NOT CONTINUE WITH THIS PROCEDURE WITHOUT REMOVING THE LINE CORD FROM THE VCM-D1**.
3. Unplug the line cord from the AC module receptacle. Do not proceed without removing the line cord from the **VCM-D1**.
4. Position the **VCM-D1** unit so that the rear panel is facing you.
5. Using the small flat-bladed screwdriver or similar tool, insert the tool into the cover door slot, gently pry open cover door.
6. Insert the tool into the fuse holder slot and gently pry out the fuse holder block.
7. Remove defective fuse(s); replace with new fuse(s).
8. Replace fuse holder into housing
9. Close the cover door.

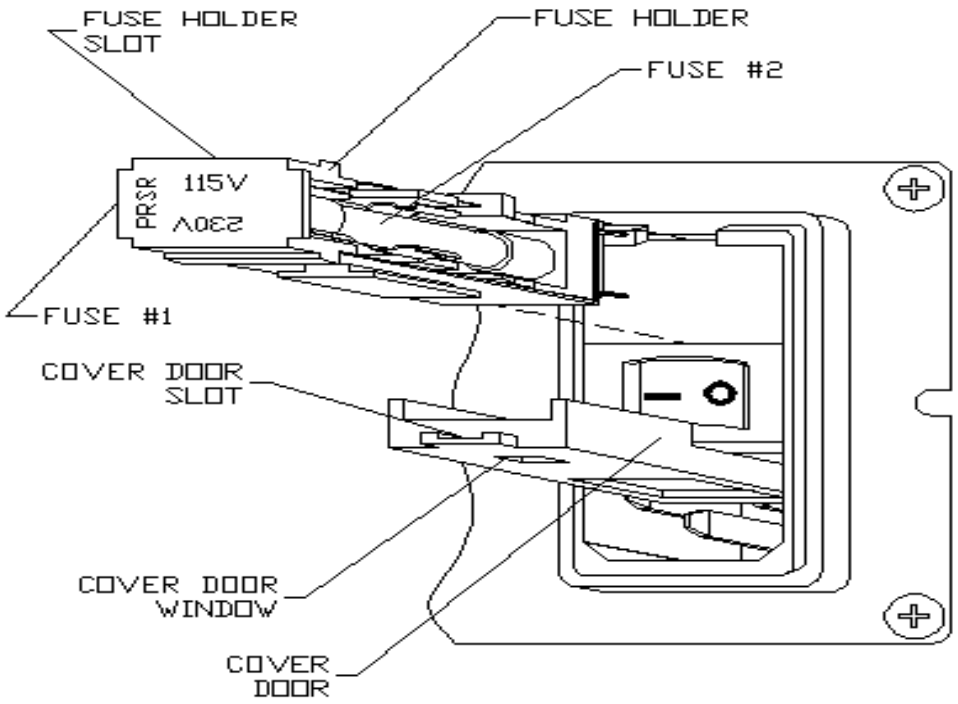



**Figure 1: AC Input Module**

## Voltage Change

**WARNING**

*To avoid injury or death, unplug the line cord from the line voltage power source before continuing.*

**AVERTISSEMENT**

*Pour éviter les risques de blessures ou mort, débranchez le cordon d'alimentation de la source de tension avant de débuter cette précédure.*

1. Please refer to Figure 1.
2. Repeat steps 1 ─ 6 in **Line Fuse Replacement** instructions.
3. To change from 115 VAC to 230 VAC, rotate the fuse holder block 180°.
4. Replace the two 3AG, 0.5A time-lag fuses with two 3AG, 0.25A time-lag fuses. *(Note: Be sure to change fuses back to 3AG, 0.5A time-lag fuses when changing back to 115VAC).*
5. Replace fuse holder block and close the cover door. The desired line voltage will be indicated in the cover door window.

## Shutter Fuse Replacement

1. Please refer to Figures 2 for the **VCM-D1** front panel layout.
2. A medium flat-bladed screwdriver or similar tool is needed to complete this procedure.
3. Power the unit OFF and disconnect the line cord from the line voltage power source.
4. Position the **VCM-D1** unit such that the front panel is facing you. If necessary, disconnect the shutter cable from its 5-pin SHUTTER connector on the rear panel.
5. Using the screwdriver, or similar, insert the tool into the slot on the SHUTTER FUSE cap. Apply slight inward pressure and rotate the cap 1/8 turn, counterclockwise. The fuse cap will pop out slightly.
6. Remove the fuse cap and fuse.
7. Replace the fuse with a known good one. The shutter fuse is a 0.6 A, 5 x 20 mm, time-lag (slo-blo) type.
8. Reverse the procedure to re-install the fuse cap, reconnect all cables and power the unit back up.

## Initial Operation and Testing

**WARNING**

*Be sure power switch is in the off position before connecting the power cord to line. Attach line cord to the unit first before plugging into the AC power source.*

**AVERTISSEMENT**

*Veuillez vous assurer que le commutateur d'alimentation est en position OFF (éteinte) avant de brancher le cordon d'alimentation. Branchez d'abord le cordon d'alimentation à l'appareil avant de le raccorder à la source de tension*

1. The **VCM-D1** is manually selectable to operate from 115 VAC or 230 VAC (50-60Hz). **PLEASE BE SURE THAT THE UNIT IS PROPERLY SET UP FOR THE LINE VOLTAGE TO BE USED.** Refer to the **Voltage Change** section of this manual for further information and procedures.
2. Once the line cord has been attached to unit and connected to a properly grounded wall receptacle, the unit may be energized. See **Start Up** section.
3. Insert the 5-pin male connector of shutter interconnect cable into 5-pin female receptacle at rear of unit labeled SHUTTER.
4. Connect the 7-pin female connector of shutter-interconnect cable to 7-pin male connector on shutter to be driven.
5. Place POWER switch to the ON "1" position, the POWER LED will illuminate.
6. Place the N.O./N.C. switch into the N.O. position. The shutter will open and remain open until the switch is returned to the N.C. position. The green DRIVER LED will illuminate when this switch is in the N.O. position.
7. All ***UNIBLITZ*** drivers provide the circuitry necessary to support shutters equipped with the solid state synchronization option. Simply plug the shutter-interconnect cable into the driver. If the shutter is equipped with this option the green LED labeled SYNC will illuminate when the shutter is in the open position. In addition, the SYNC output BNC will change to the active state when the shutter is open. The absence of the solid state synchronization option will inhibit the operation of the SYNC output and SYNC LED. The remainder of the **VCM-D1** systems will not be affected.
8. See SPECIFICATIONS and OPERATOR CONTROLS for additional operational information concerning other features of the **VCM-D1**.
9. Should the shutter and/or controller not respond as described previously, be sure line cord is installed into the receptacle and connections to the shutter are made properly. Note that the shutter output is also fused, located at the front panel (0.6 A, 5 x 20 mm

time-lag). Check these fuses for failure. Please see the **Shutter Fuse Replacement** section elsewhere in this manual.

10. Be advised, a visual inspection of a fuse is usually **NOT** an adequate test to determine if a fuse failure has occurred. Use a DMM (Digital Multi-Meter) or equivalent test device to determine fuse continuity.

| | |
|---|---|
| **CAUTION** | *Turn off the unit and remove the plug from the AC source before checking for blown fuses.* |
| **PRUDENCE** | *Éteignez l'appareil et débranchez le cordon d'alimentation de la source de tension AC avant de vérifier si les fusibles sont brulés.* |

11. Additionally, please note that particular shutter units respond to different minimum pulse widths. For example, a standard VS25 shutter has a minimum exposure pulse of 6 ms. If the timing is set for an exposure pulse width less than 6 ms the shutter may not open fully.
12. If the unit still does not operate properly, turn off and disconnect the unit. Please notify Vincent Associates immediately. There are no user-serviceable parts outside or inside of the unit.

# Operator Controls

## VCM-D1 Front Panel Operator Controls

Please refer to Figure 2.

1. **CONTROL** Terminal block. The seven-position terminal block referred to on the driver (and throughout this manual) as CONTROL provides access to several of the input and output connections for external operation of your driver. Each terminal is explained below:
   a. **CONTROL #1 Output**: +10.0 VDC provided for remote switching applications or control circuits.
   b. **CONTROL #2 Pulse In**: Active-high input to control shutter exposure for duration of positive pulse or electronic or mechanical switch contact closure. Shutter will follow pulse and frequency applied to this input. This will operate the same as when the PULSE INPUT BNC is set to the active-high mode.
   c. **CONTROL #3 GND:** This ground point allows user to connect input or output signals to ground (common) the **VCM-D1** circuit.
   d. **CONTROL #4 Input**: DC interrupt voltage. With key switch set to mode B, the interrupt will be activated when input DC voltage (+8VDC min.) is disrupted via a switch, transistor, or similar method. ***Note: This input is for DC voltage only.***
   e. **CONTROL #5 Output**: When an interrupt is activated this *normally-low* output is *high* until a RESET deactivates the interrupt.
   f. **CONTROL #6 AUX Output**: The **VCM-D1** AUX output is an active-low pulse output that can be toggled TTL-high and TTL-low from commands to the RS-232C control input. See **AUX Out (CONTROL pin 6)** under EXTERNAL OUTPUT CHARACTERISTICS.
   g. **CONTROL #7 Output:** +5.0 V is provided for remote switching applications or control circuits.
2. **MODE** Key switch**:** The position of the key switch sets the interrupt mode. It disables the shutter driver when a voltage interrupt is detected, either AC or DC. Upon reset, the shutter will return to the position set by an external input or the position of the N.O./N.C. toggle switch.
   a. **STD:** The STD mode bypasses the driver's interrupt capabilities. CONTROL #4 and CONTROL #5 become inactive. The **VCM-D1** will not remain disabled after a disruption in line voltage.
   b. **A** (AC interrupt mode): Prevents the driver from re-opening the shutter immediately upon power-up if the line voltage were to be interrupted. The driver remains disabled until user supplies reset by specified means.
   c. **B** (DC interrupt mode): When the key switch is in Position B the driver will become disabled when it detects that the DC input voltage at CONTROL #4 has been removed or disrupted. When the voltage level is re-applied, the driver remains

disabled until reset. The DC input voltage is supplied (from CONTROL #1) or from an external source, determined by the user.

3. **SYNC** Indicator. A green LED indicator that indicates status of Solid State Synchronization output. The LED is illuminated when shutter's electronic synchronization is activated. Note: This LED functions only if the shutter used is equipped with the Solid State Synchronization system.
4. **DRIVER** Indicator. A green LED that indicates when the internal shutter driver circuit input has an active signal present.
5. **DISABLED** Indicator. This red LED indicates that one of the two interrupt modes (mode A or mode B) has disabled the driver. LED is off after RESET, and STD operation.
6. **RESET** Momentary Pushbutton Switch. Resets **VCM-D1** disabled by interrupts (mode A or mode B) and returns shutter to the position determined by the N.O./ N.C., or the status of the PULSE input. The TRIGGER flip-flop is also reset. If the shutter had been activated by this input the shutter will close after a reset pulse. Please note, if an OPEN command is sent to the RS-232C input, a RESET command will not clear the RS-232C input and the shutter will not close. A CLOSE command must be sent to command the shutter to close. To have the shutter close or return to the state as set by the N.O./N.C. switch with a RESET command or the RESET switch, the shutter must be opened with a TRIGGER command.
7. **LOCAL/REMOTE** Toggle switch. In the LOCAL position all inputs to the unit are effectively disconnected allowing the user to manually control the shutter without the need to remove the signals from the BNC inputs or the front panel terminal strip. In the REMOTE position, the unit will function normally. RS-232C signals are also disabled with this switch in the LOCAL position.
8. **POWER** Indicator. Illumination of this green LED indicates that power is applied to the unit.
9. **SHUTTER FUSE**. Replace with 5 x 20mm, 0.6A, "T" time-lag fuse. *This fuse may fail if the shutter is operated at an excessive frequency and duty cycle to protect the coil from premature failure. If the operation of the shutter used is causing "nuisance blowing" of this fuse, please contact technical support to discuss your application.*
10. **N.O./N.C**. Toggle switch. The position of this switch determines shutter status BEFORE a trigger signal is received by the VCM-D1.
    a. In the N.C. position the shutter will be activated open by an input pulse signal.
    b. In the N.O. position the shutter will be activated closed.
    c. The N.O./N.C switch acts to invert the shutter operation.
    d. Any RESET command will return the shutter to the position determined by the N.O./N.C. switch.
    e. Please note, if an open command is sent to the RS-232C input, a RESET command will not clear the RS-232C input and the shutter will not close. A CLOSE command must be sent to command the shutter to close.

f. If it is desired to have the shutter close or return to the state as set by the N.O./N.C. switch with a RESET command or the RESET switch, the shutter must be opened with a TRIGGER command.

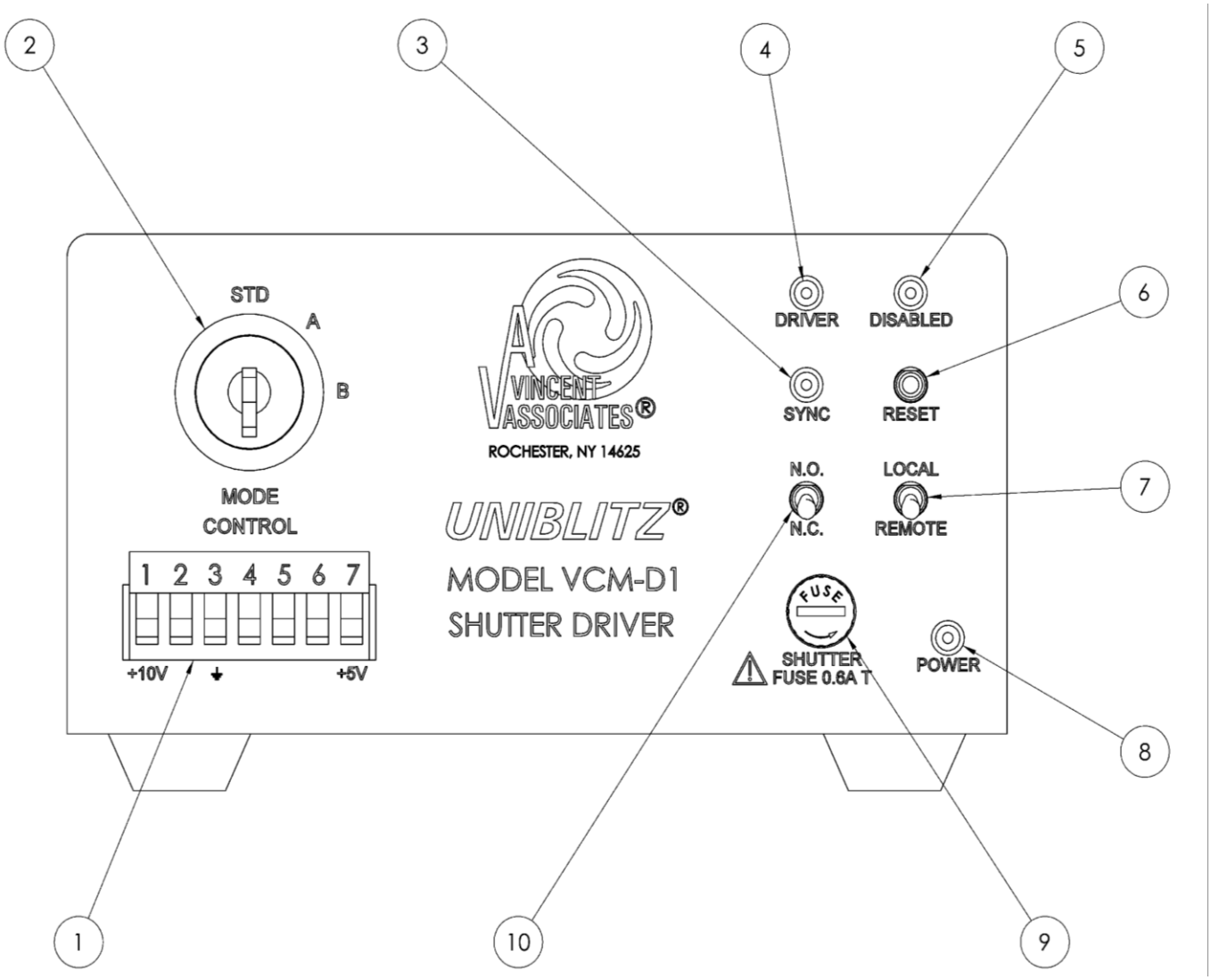


**Figure 2: VCM-D1 Front Panel Operator Controls**

# Notes

## VCM-D1 Rear Panel Operator Controls

Please refer to Figure 3.

1. **ADDRESS** Select switch. An 8-position octal rotary switch that selects the active RS-232C address of the unit. See **ADDRESS Select** under GENERAL CHARACTERISTICS.
2. **PULSE INPUT** BNC. Allows control of the shutter exposure and frequency from a TTL signal source.
   a. The pulse duration determines the shutter exposure interval.
   b. The frequency of the signal presented to this input determines the frequency of shutter exposures.
   c. This input can be set active-high or active-low by FUNCTION Switch **C**. See **FUNCTION Select** under GENERAL CHARACTERISTICS.
3. **RS-232C** Dual RJ45 female jack. Provides access to the **VCM-D1** RS-232C interface allowing the user to control input functions via commands sent from a computer RS-232C serial port.
   a. The INPUT connector accepts commands directly from a computer's serial port or from another VCM-D1 in the daisy-chain.
   b. The OUTPUT connector allows the controller to send commands to the next controller in the daisy-chain. For further reference see Figure 5. See also **RS-232C INPUT** under EXTERNAL INPUT SPECIFICATIONS and **RS-232C OUTPUT** under EXTERNAL OUTPUT SPECIFICATIONS.
4. **TRIGGER INPUT** BNC. Allows for pulsed-open/pulsed-close shutter operation.
   a. Opens the shutter on the first pulse trigger edge.
   b. Closes the shutter on the next trigger edge.
   c. This input operates in conjunction with the GATE INPUT. When the GATE INPUT is active, the TRIGGER INPUT will be enabled.
   d. This input can be set active-high or active-low by FUNCTION switch **A**. See **FUNCTION Select** under GENERAL CHARACTERISTICS.
5. **RESET INPUT** BNC. Resets the **VCM-D1** disabled feature by an interrupt (MODE A or MODE B) when switched to ground level via TTL logic or simply shorting to ground through a switch contact.
   a. TTL logic pulse returns the shutter to the position determined by the N.O./N.C. toggle switch.
   b. When the shutter is opened via the TRIGGER INPUT, a TTL pulse presented to the RESET input will close the shutter.
   c. Note that if an OPEN command is sent to the RS-232C input, a RESET command will not clear the RS-232C input and the shutter will not close. A CLOSE command must be sent to allow the shutter to close.

d. In order to have the shutter close or return to the state as set by the N.O./N.C. switch with a RESET command, the shutter must be opened with a TRIGGER command.

e. This input can be set active-high or active-low by FUNCTION switch **B**. See **FUNCTION Select** under GENERAL CHARACTERISTICS.

6. **GATE INPUT** BNC. The presence of an active signal will enable trigger signals presented to the TRIGGER INPUT BNC.

   a. An unused GATE INPUT is in the active state.

   b. When this signal goes inactive, the TRIGGER INPUT will disable. In this way, the user can effectively "gate" a stream of trigger pulses and allow one or more to be received, as determined by the user, by the **VCM-D1**.

   c. This input can, therefore, be used to "pick" a pulse or pulses from a series of trigger pulses presented to the TRIGGER INPUT BNC.

   d. Note that it must be used in conjunction with the TRIGGER INPUT.

   e. It can be set active-high or active-low by FUNCTION switch **D**. See **FUNCTION Select** under GENERAL CHARACTERISTICS.

7. **SHUTTER** Output: A 5-pin SwitchCraft™ female push-lock type receptacle. This mates with the 5-pin SwitchCraft™ male plug of the 3-meter, Model **710A** interconnect cable included with the unit. Pin-out is as follows, wire colors indicate 710A cable and shutter wiring layout:

| *SwitchCraft™ Pin Number* | **Description** | **Shutter** | **710A** | **WirePro Pin Number** |
|---|---|---|---|---|
| *1* | Shutter Actuator Coil Drive Output | Red | Red | A |
| *2* | Shutter Actuator Coil Drive Output | Brown | Black | B |
| *N/C* | N/C | N/C | N/C | C |
| *4* | Circuit Ground | Green | Green | D |
| *5* | Sync Detector Transistor Input | Yellow | Orange | E |
| *3* | +5.0 VDC Power Supply Output | Blue | White | F |
| *Lug* | Shutter Ground | Black | Drain | H |

**Table 1: 5-Pin SwitchCraft Pin-Out**

8. **Input module**: 115 VAC 60Hz /230 VAC 50Hz. Mates with female IEC plug on supplied line cord. Includes the following additional functions:
   a. Power switch: "0" is off, "1" is on.
   b. Power fuses:
      i. Two 3AG, ½Amp, time-lag (Slo-Blo), for 115 VAC 60Hz.
      ii. Two 3AG, ¼Amp, time-lag (Slo-Blo), for 230 VAC 50Hz.

      See **LINE FUSE REPLACEMENT** instructions.
   c. Voltage change switchover block. See **Voltage Change** instructions.
   d. 3A line filter. (Internal, not user accessible)
9. **FUNCTION** switches. Eight sub-miniature slide switches.
   a. Switches **A—D** are used to select the active states of each of the four BNC input connectors.
   b. Switches **E—F** are used to select the active states of each of the two BNC output connectors. Please see **FUNCTION Select** under GENERAL CHARACTERISTICS.
   c. Switch **G** allows the user to disable the electronic synchronization circuit. Slide switch to the up position to disable the electronic sync. This shuts off the infrared emitter internal to the shutter which in turn disables the SYNC OUTPUT.
   d. Switch **H** is used to select the proper pulse energy for the shutter being driven.
      i. The HIGH (up) position is used for 35 mm and larger aperture shutters types.
      ii. The LOW (down) position for all other shutter types, 25 mm and smaller.
10. **SYNC OUTPUT** BNC. For shutters equipped with the SOLID STATE SYNCHRONIZATION SYSTEM option.
   a. The shutter's internal sync circuit sets the BNC to an active level when the sync circuit becomes active.
   b. The output goes *active* when the shutter reaches 80% of full open, and goes *inactive* when the shutter reaches 20% closed.

c. The front panel SYNC LED illuminates when the sync output is active.

d. This output can be disabled with FUNCTION switch **G** – see above.

e. This input can be set active-high or active-low by FUNCTION switch **F**. See **FUNCTION Select** under GENERAL CHARACTERISTICS.

11. **PULSE OUTPUT** BNC. Used to daisy-chain **VCM-D1** units together. The pulse duration is equal to the duration of the shutter exposure pulse.

    a. A TTL exposure pulse input to the PULSE INPUT BNC will appear at the PULSE OUTPUT BNC.

    b. Toggling the N.O./N.C. switch will **not** change the state of the PULSE OUTPUT.

    c. This input can be set active-high or active-low by FUNCTION switch **E**. See **FUNCTION Select** under GENERAL CHARACTERISTICS.

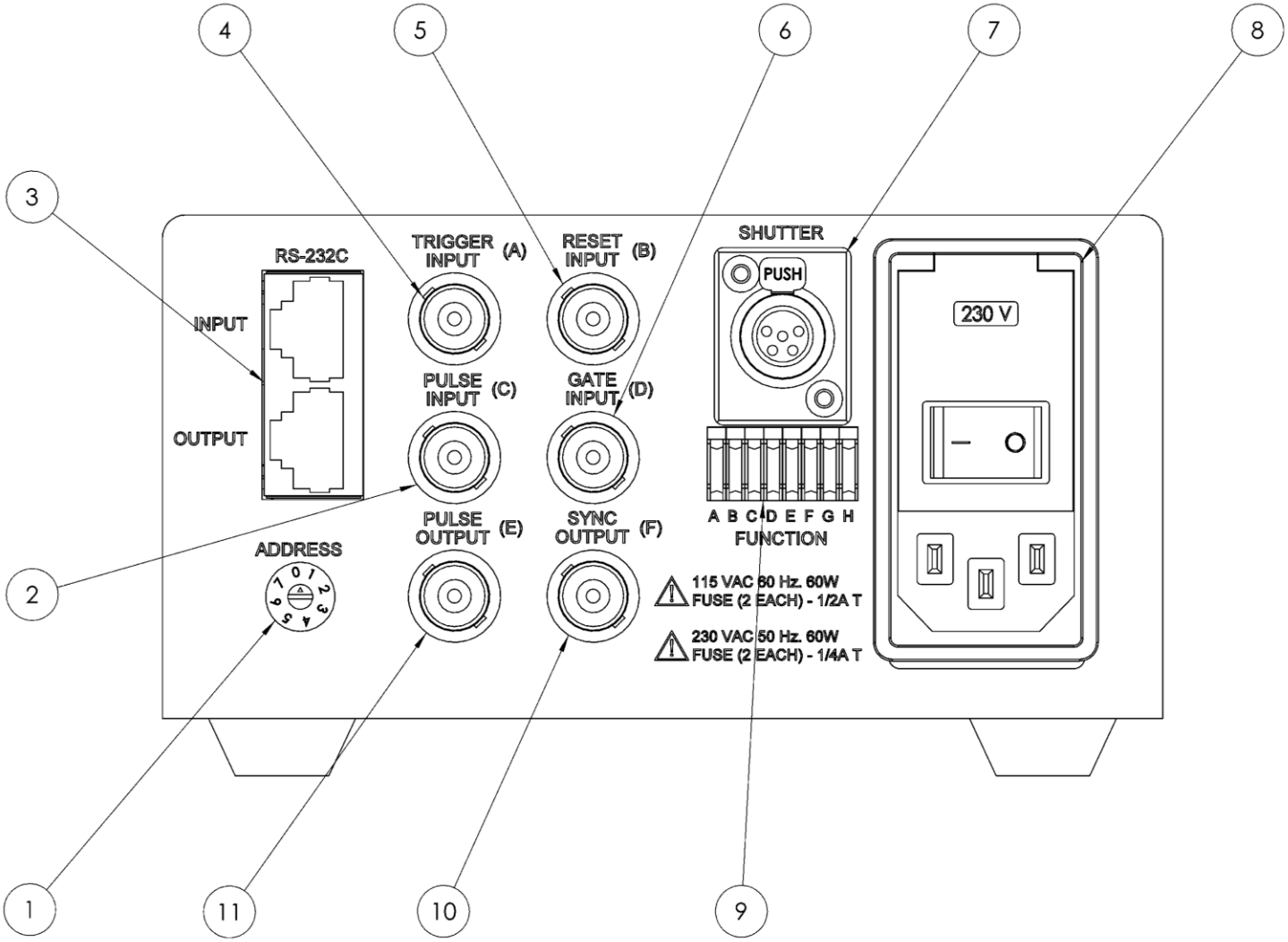



**Figure 3: VCM-D1 Rear Panel Operator Controls**

# Operating Basics

Please refer to the INITIAL OPERATION AND TESTING section of this document for initial preparation to put the **VCM-D1** into operation.

## Function Switches

The FUNCTION switches are located at the rear panel. This is a bank of eight miniature slide-switches.

1. Switches **A – F** select the active state of the four BNC inputs and two BNC outputs.
   ***a.*** In the *down* position the corresponding BNC input or output will be TTL active-low. This indicates that a logic "0" (0 volts) will activate the selected input or what state the output will switch to when activated.

| | |
|---|---|
| ***CAUTION*** | *Do not connect a 710R or 710R/F to an output. It will damage the output circuitry.* |
| ***PRUDENCE*** | *Ne branchez pas le câble 710R ou le 710R/F aux connecteurs des sorties BNC de l'appareil, car cela va endommager le circuit de la sortie.* |

*Note: The switches must be in the active-low position to activate the inputs from the Model 710R (handheld) or the Model 710R/F (foot activated) remote activate cables.*

   b. In the *up* position the selected BNC input will become TTL active-high. This indicates that a logic "1" (+5 volts) will activate the selected input or produce an active-high output.

2. Switch **G** disables the electronic synchronization circuit. In the *up* position it will disable the shutter's electronic sync. This shuts off the infrared emitter internal to the shutter which in turn disables the SYNC OUTPUT.
3. Switch **H** selects HIGH/LOW pulse energy.

**CAUTION**

*The HIGH-energy setting must be used for only the 35 mm and larger aperture shutters. Use the LOW position for all other Uniblitz shutters. Use of the HIGH position for shutter apertures smaller than 35 mm will damage the shutter and will void the shutter's limited warranty.*

**PRUDENCE**

*Le réglage d'énergie d'impulsion "HIGH" ne doit être utilisé que pour les obturateurs d'un diamètre de 35mm ou plus. Veuillez utiliser le réglage "LOW" pour tous les autres obturateurs Uniblitz. L'utilisation du réglage "HIGH" pour des obturateurs d'un diamètre plus petit que 35mm va endommager l'obturateur et annuler la garantie limitée de l'obturateur.*

a. HIGH energy is required to operate 35 mm and larger aperture shutters.
b. When the switch is in the *down* position the pulse energy is selected LOW.
c. When the switch actuator is in the *up* position the pulse energy is selected HIGH.

## Gate Input

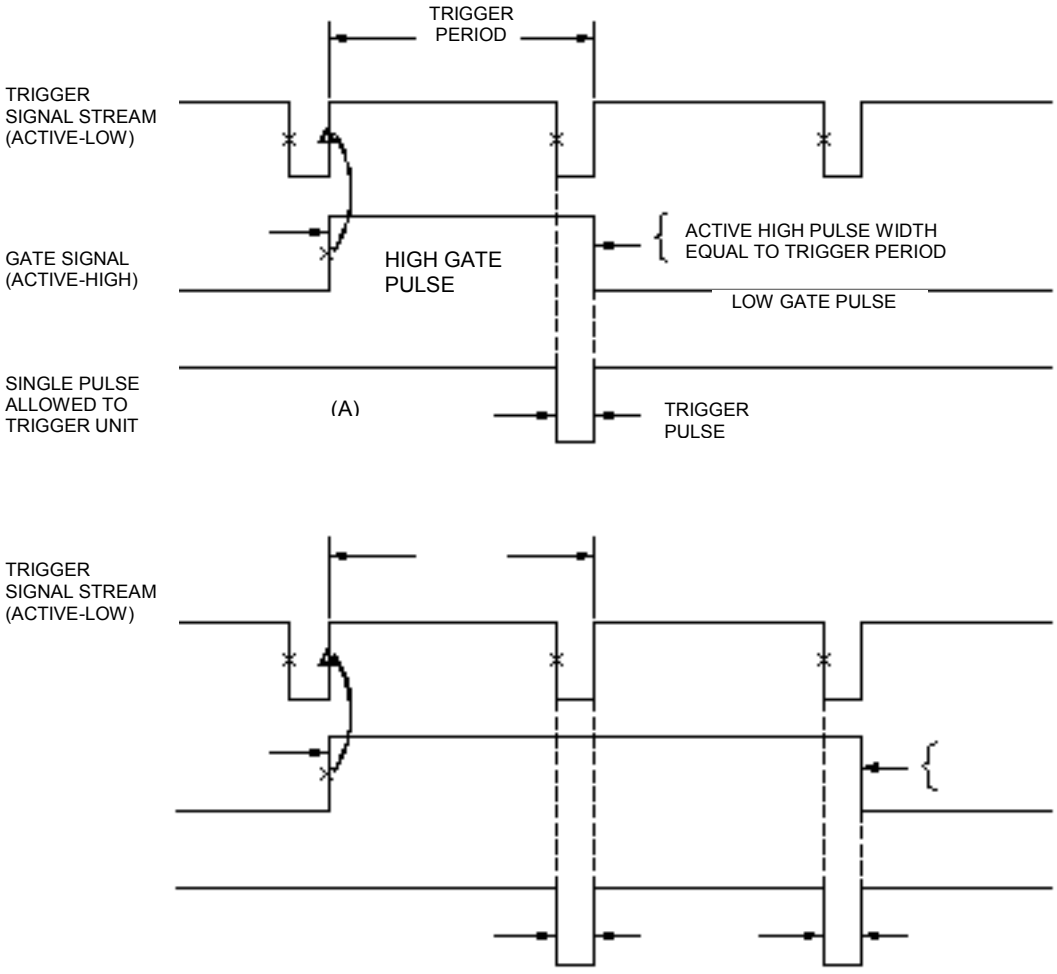
The GATE INPUT BNC is used in conjunction with the TRIGGER INPUT BNC. This input allows the user to *pick* from one to a finite number of trigger pulses to trigger the controller from a continuous stream of pulses arriving at the TRIGGER INPUT. Please see Figure 4.

The following description assumes the GATE INPUT BNC is selected active-high with FUNCTION switch D *up* and the TRIGGER INPUT BNC selected to the active-low state with FUNCTION switch A *down*.

When a stream of trigger pulses is presented to the TRIGGER INPUT and the GATE INPUT is in the *high* state (TTL logic "1", +5.0 V), the TRIGGER signals will operate the **VCM-D1** as described in the **OPERATOR CONTROLS** section.

Once the GATE INPUT changes to the *low* state (TTL logic "0", 0 V), all trigger signals being sent to the TRIGGER INPUT are disabled. If a single TTL-high pulse equal to the trigger period is presented to the GATE INPUT, the **VCM-D1** will enable one trigger signal from the trigger stream as depicted in Figure 4A.

If a single TTL-high pulse equal to twice the trigger period is presented to the GATE INPUT, two trigger signals from the trigger stream are enabled as depicted in Figure 4B. Therefore, the number of trigger pulses or GATE INPUT duration is equal to the trigger period times the number of exposures desired. The **VCM-D1** TRIGGER INPUT *opens* the shutter with the first pulse presented to the input and *closes* the shutter on the subsequent pulse.


TRIGGER
PERIOD
TRIGGER
SIGNAL STREAM
(ACTIVE-LOW)
GATE SIGNAL
(ACTIVE-HIGH)
HIGH GATE
PULSE
ACTIVE HIGH PULSE WIDTH
EQUAL TO TRIGGER PERIOD
LOW GATE PULSE
SINGLE PULSE
ALLOWED TO
TRIGGER UNIT
(A)
TRIGGER
PULSE
TRIGGER
SIGNAL STREAM
(ACTIVE-LOW)

## Figure 4A and 4B: Gate Input Timing Diagram

## Mode Selection

The **VCM-D1** mode of operation can be selected with the front panel **MODE** key switch. The key can be removed in any position to prevent the switch position from inadvertent changes. This will ensure that if an interrupt is set, the shutter will not return to its original state until the **VCM-D1** unit is reset (by any of a number of methods).

1. **A Mode**: The unit will operate normally until AC line voltage is lost. When the AC voltage is restored, the DISABLED LED will illuminate and CONTROL #5 on the front panel will be active-high. When reset the unit will return to its original state. Be advised that when the key switch is switched from the STD to the A mode the unit will initially be disabled. A RESET will return the controller to its operating state.
2. **B Mode:** The unit will operate normally until DC voltage to the CONTROL #4 input is lost.

   A complete circuit must be made from either CONTROL #1 (+10VDC) or an External power source to the CONTROL #4 input.

   When the power source is removed from the CONTROL #4 input, the unit will be disabled and the DISABLED LED will be illuminated if and only if the input is restored.

   When the input voltage is restored the DISABLED LED will be illuminated and the CONTROL #5 will be active-high.

   When reset the unit will return to its original state. Note that as an added safety feature in this mode, a loss of AC voltage will also disable the unit.
3. The shutter's original state can be set by the N.O./N.C. switch or by an external input signal.

   If the shutter has been opened by an RS-232C OPEN command, and a B interrupt occurs, the shutter's state will be restored upon a RESET.

   Only a CLOSE command will close the shutter.

   If an A interrupt occurs, when power is restored the RS-232C system is reset and the shutter will be closed assuming a normally closed shutter type is in use.

   If the shutter has been opened by the TRIGGER INPUT or an RS-232C trigger command and an **A** or **B** interrupt occurs, the shutter will close when the unit is reset. A new command will need to be input to re-open the shutter.
4. **STD Mode**: All functions of the interrupt will be disabled and the unit will operate from all system controls and inputs.

## RS-232C Operation

The **VCM-D1** inputs can be controlled via an RS-232C computer serial signal COM port. From a computer's RS-232C serial port, connect a cable such as the Model **810RJ** (not supplied) or a user-constructed cable with connections per the INPUT SPECIFICATIONS to the unit's RS-232C interface.

The RS-232C input is configured in the ***null modem configuration***. Connect the Tx (transmit) from the host to the Rx (receive) on the **VCM-D1** control unit. All other lines are not used except for the Ground connection.

When using the Model **810RJ** cable, the **910RJF** adapter is required to connect the **VCM-D1** to the host computer. The **910RJF** adapter is included as part of the **810RJ** cable assembly.

If the host uses a 25-Pin D-sub or an 8-Pin Mini-DIN, check the computer's user manual to find the correct corresponding pin-outs. A cable will need be connected or an appropriate adapter purchased to connect the Model **810RJ** to the host. In most cases the corresponding 25-Pin D-Sub pin-out and MAC 8-Pin Mini-DIN are as follows:

| Function | | RJ45 INPUT | RJ45 OUTPUT | IBM DB-9M | IBM DB-25M | MAC Mini-DIN-8F |
|---|---|---|---|---|---|---|
| **Rx** | Receive Data | 5 | 5 | 2 | 3 | 5 |
| **Tx** | Transmit Data | 6 | 6 | 3 | 2 | 3 |
| **GND** | Signal Ground | 4 | 4 | 5 | 7 | 4 |

**Table 2: General Pin-Outs for 25-Pin D-Sub and MAC 8-Pin Mini-DIN**

All other pins not used. Be sure to connect the Tx pin, Pin 3 from the IBM 9-Pin D-Sub (or Pin 2 from the 25-Pin D-Sub) male connector to the Rx pin, Pin 5 of the **VCM-D1** rear panel RJ45 INPUT connector for proper operation. Connect all other functions as indicated above.

By sending the proper commands, the unit will respond by activating the proper function. The program listed on page 33 will allow operation of the **VCM-D1** from the computer keyboard.

Activation of the shutter with any of the following will deactivate the shutter:

a. A TRIGGER command through the RS-232C input.

b. A RESET command from the control unit's front panel.

c. Through the RESET INPUT BNC on the rear panel.

d. A RESET command through the RS-232C input.

e. A subsequent TRIGGER command from the RS-232C input.

When an OPEN command is sent to a controller, a RESET command will **not** close the shutter. The shutter must be closed with a CLOSE command.

## Daisy-Chain Configuration

Up to eight **VCM-D1** units can be daisy-chained together through the same serial port using a Model **810RJ** cable for each controller in the chain. Figure 5 illustrates connecting two controllers from a single serial port. Once connected, each unit will require a unique address in the chain. This is accomplished by adjusting the octal switch beneath the Dual RJ45 jack on the rear panel to the desired address. See **ADDRESS Select** under GENERAL CHARACTERISTICS in the SPECIFICATIONS section for a complete listing of the command range for each octal switch position. The specific local command range set will decode commands sent via the serial port. A set of global commands is also available to control all units connected to the serial port.

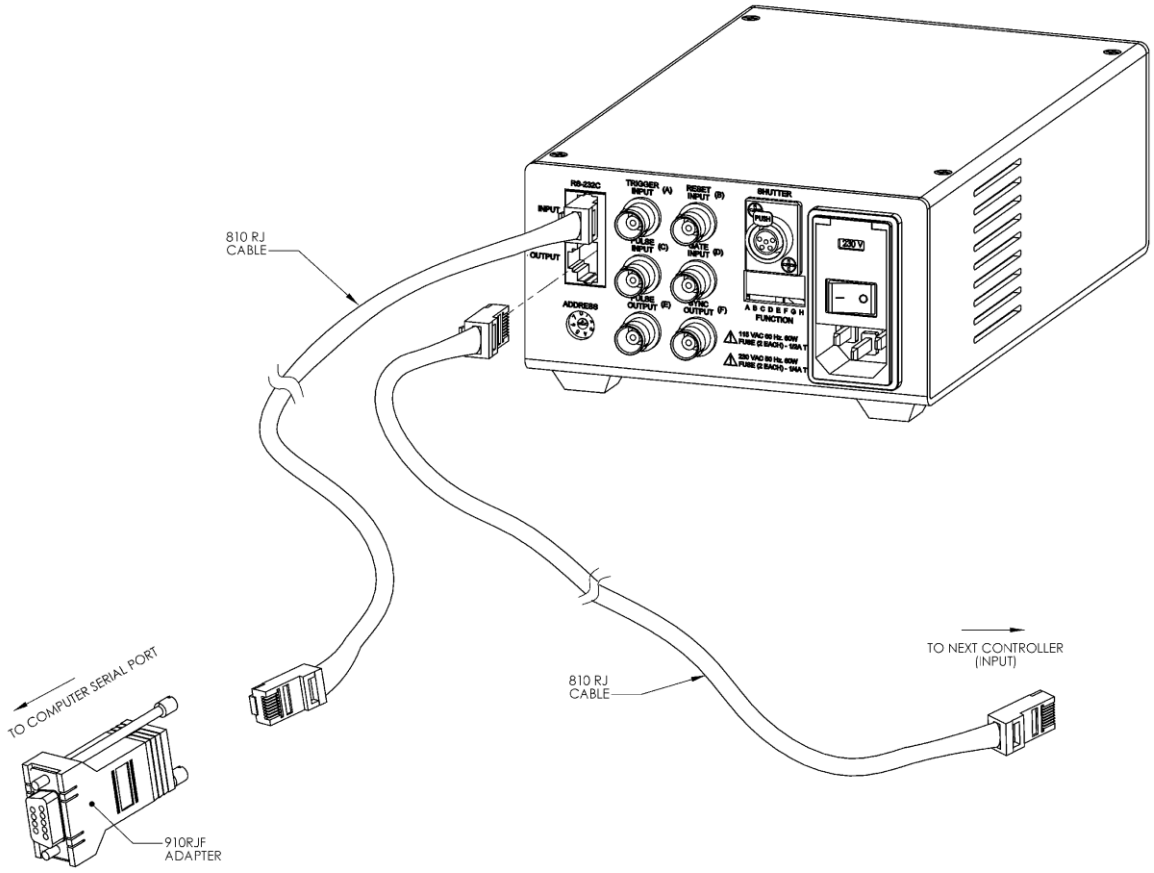



**Figure 5: VCM-D1 Daisy-Chain Cable Configuration**

## RS-232C Test Program

The following is a test program written to test the input commands to the RS-232C interface of the **VCM-D1** Controller. This program and LabView programs (not shown here) are available by download from the RESOURCES section of our website (www.uniblitz.com), via e-mail (vincentassociates@uniblitz.com), or calling (800) 828-6972. Other programs may be available, please contact technical support for further information.

### RS-232C Test Program

```
REM PROGRAM TO SEND DECIMAL COMMANDS TO RS232 INTERFACE,
XILINX CPLD.
REM WRITTEN BY RICHARD ST.LOUIS, VINCENT ASSOCIATES.
REM LAST REVISION 5/13/2003
```

```
CLS 0
K = -1
WHILE K
        OPEN "COM1:9600,N,8,1,CS0,DS0" FOR RANDOM AS #1
        J = 64
        C$ = "X"
MENU:          PRINT
               PRINT
               PRINT
               PRINT "WAITING FOR KEYSTROKE COMMAND  "
               PRINT "TYPE:"
               PRINT "          VCM-D1             "
               PRINT "         --------            "
               PRINT "     O - OPEN Shutter         "
               PRINT "     C - CLOSE Shutter        "
               PRINT "     T - TRIGGER Control      "
               PRINT "     R - RESET Control        "
               PRINT "     E - ENABLE Aux-Out       "
               PRINT "     D - DISABLE Aux-Out      "
               PRINT "     G - GATE On              "
               PRINT "     F - GATE Off             "
               PRINT
               PRINT "     S - SET Octal Switch Address "
               PRINT "         (Current Starting Decimal # ="; J; ")"
               PRINT "         (Current Octal Address Value = "; C$; ")"
               PRINT
               PRINT "     Q - QUIT Program         "
               PRINT
               PRINT
START: A$ = INKEY$
               IF A$ = "O" OR A$ = "o" THEN
                        PRINT #1, CHR$(J);
                        PRINT "SHUTTER OPEN COMMAND SENT"
                        GOSUB TIMEOUT
                        GOTO MENU
                        ELSEIF A$ = "C" OR A$ = "c" THEN
                                 PRINT #1, CHR$(J + 1);
                                 PRINT "SHUTTER CLOSE COMMAND SENT"

                                 GOSUB TIMEOUT
                                 GOTO MENU
                        ELSEIF A$ = "T" OR A$ = "t" THEN
                                 PRINT #1, CHR$(J + 2);
                                 PRINT "CONTROL TRIGGER COMMAND SENT"
                                 GOSUB TIMEOUT
                                 GOTO MENU
```

```
                    ELSEIF A$ = "R" OR A$ = "r" THEN
                            PRINT #1, CHR$(J + 3);
                            PRINT "CONTROL RESET COMMAND SENT"
                            GOSUB TIMEOUT
                            GOTO MENU
                    ELSEIF A$ = "E" OR A$ = "e" THEN
                            PRINT #1, CHR$(J + 4);
                            PRINT "ENABLE AUX COMMAND SENT"
                            GOSUB TIMEOUT
                            GOTO MENU
                    ELSEIF A$ = "D" OR A$ = "d" THEN
                            PRINT #1, CHR$(J + 5);
                            PRINT "DISABLE AUX COMMAND SENT"
                            GOSUB TIMEOUT
                            GOTO MENU
                    ELSEIF A$ = "G" OR A$ = "g" THEN
                            PRINT #1, CHR$(J + 6);
                            PRINT "GATE ON COMMAND SENT"
                            GOSUB TIMEOUT
                            GOTO MENU
                    ELSEIF A$ = "F" OR A$ = "f" THEN
                            PRINT #1, CHR$(J + 7);
                            PRINT "GATE OFF COMMAND SENT"
                            GOSUB TIMEOUT
                            GOTO MENU
                    ELSEIF A$ = "Q" OR A$ = "q" THEN
                            K = 0
                            PRINT "PROGRAM TERMINATED"
                    ELSEIF A$ = "S" OR A$ = "s" THEN
                       INPUT "ENTER OCTAL ADDRESS 0 - 7 or X: ", B$
                       GOSUB ADDRESS
                       GOTO MENU
                    ELSE GOTO START
            END IF
WEND
END
TIMEOUT:     FOR I = 1 TO 100: NEXT I
                    CLS 0
                    RETURN
ADDRESS:     IF B$ = "X" OR B$ = "x" THEN
                                J = 64
                                C$ = "X"
                                ELSEIF B$ = "0" THEN
                                J = 128
                                C$ = "0"
                                ELSEIF B$ = "1" THEN
```

```
                    J = 144
                    C$ = "1"
                    ELSEIF B$ = "2" THEN
                    J = 160
                    C$ = "2"
                    ELSEIF B$ = "3" THEN
                    J = 176
                    C$ = "3"
                    ELSEIF B$ = "4" THEN
                    J = 192
                    C$ = "4"
                    ELSEIF B$ = "5" THEN
                    J = 208
                    C$ = "5"
                    ELSEIF B$ = "6" THEN
                    J = 224
                    C$ = "6"
                    ELSEIF B$ = "7" THEN
                    J = 240
                    C$ = "7"
                    ELSE J = 64
                          C$ = "X"
END IF
PRINT "STARTING ASCII DECIMAL # = ", J
GOSUB TIMEOUT
CLS 0
RETURN
```

## Shutter Frequency of Operation

The repeat exposure specification as listed in this manual is specified at 35 msec. This is an optimum value to ensure enough pulse energy to open any ***UNIBLITZ*** shutter. However, the **VCM-D1** is capable of operating each ***UNIBLITZ*** shutter to its maximum frequency with a slight sacrifice in shutter opening speed. This is due to the drive circuit, which allows the pulse voltage to drop with an increase in frequency to compensate for the heat that is developed in the shutter coil. See graphs in Figures 6 and 7, respectively.

Contact the factory for specific information concerning shutter and/or drive modifications that may be necessary for operating shutters at their maximum frequency.

Please note that fuse blowing problems, specifically shutter fuses, may be due to high frequency operation without proper fuse selection. Due to the large number of different frequencies and duty cycles in which the shutter is used, please contact the factory for further details regarding specific fuse selection.

## Trigger Cautions and Trouble Shooting Tips

The **VCM-D1** system's capability can be greatly enhanced by external control as described previously, however, extreme care must be taken to ensure that high voltages (see SPECIFICATIONS) are not inadvertently switched into external control inputs. Also note that large negative voltages can cause irreparable damage to the unit's internal circuitry. *Exercise extreme caution*.

Visual inspection of a fuse is NOT an adequate test to determine if a fuse failure has occurred. Use a DMM (Digital Multi-Meter) or equivalent test device to determine fuse continuity.

Particular shutter units respond to different minimum pulse widths. For example, a standard VS25 shutter with Teflon-coated shutter blades has a minimum exposure pulse of 6 msec. If the timing or pulse width is set for an exposure pulse width less than 6 msec, the shutter may not open fully. If the unit still does not operate properly when using the proper pulse width, please contact Vincent Associates immediately.

Please note that if a Vincent Model **810RJ** RS-232C interface cable in not being used, a standard RS-232C cable will ***not*** work with the **VCM-D1** Controller. A **"Null Modem"** type interface cable must be used in this situation.

When operating shutters with apertures larger than 25 mm, please be sure that the FUNCTION switch **H** is set to the *upper* position. Failure to make this change may result in incomplete shutter opening and causing immediate shutter close resulting in probable loss of capture.

When operating shutters with a 25 mm aperture or smaller, please be sure that the FUNCTION switch **H** is set to the *lower* position. Failure to observe this setting is likely to cause damage to the shutter, thereby voiding the shutter warranty.

The shutter may be shipped with a small circular white plastic protective ring around the male connector contacts. This ring protects the male connector's contacts during shipping. It is held on by friction and must be removed prior to attaching the female end of the Model

**710A** cable to the shutter. This ring can be removed by gently pulling up off the top of the connector. No tools are required.

## Pulse Voltage Graphs

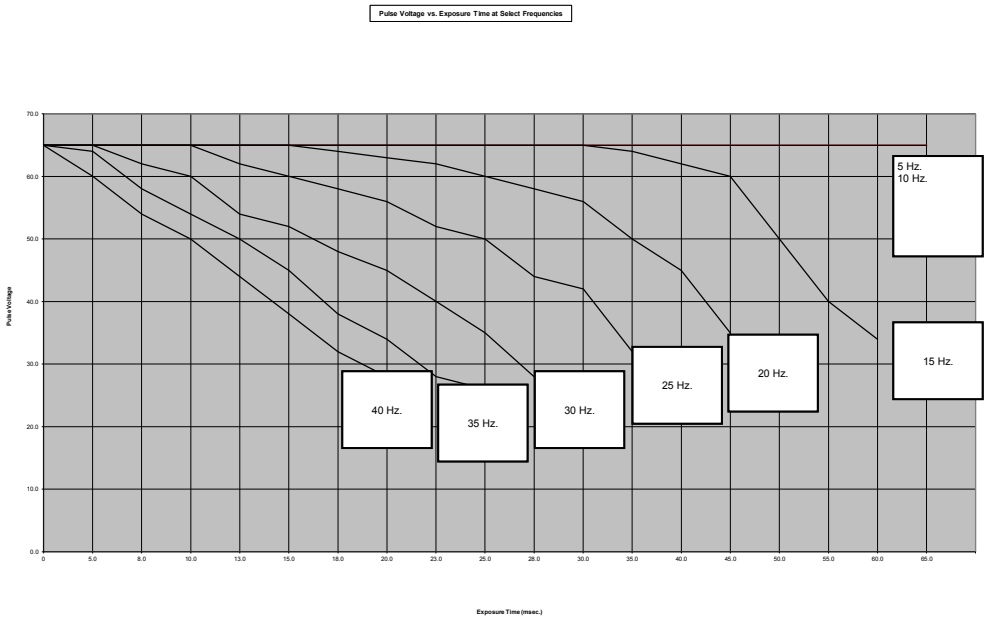



**Figure 6: Pulse Voltage vs. Exposure Time**

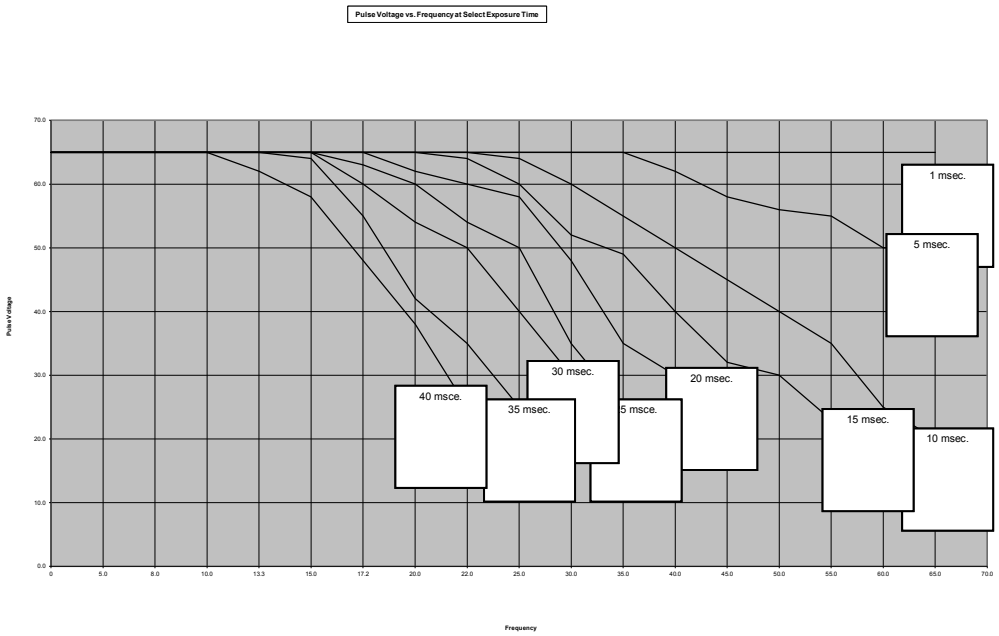

Pulse Voltage vs. Frequency at Select Exposure Time
Pulse V oltage
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0
5.0
8.0
10.0
13.3
15.0
17.2
20.0
22.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
Frequency
1 msec.
5 msec.
10 msec.
15 msec.
20 msec.
30 msec.
35 msec.
40 msce.
5 msce.

**Figure 7: Pulse Voltage vs. Frequency**

## Dimensions

The overall dimensions of the VCM-D1 are shown in Figure 8.

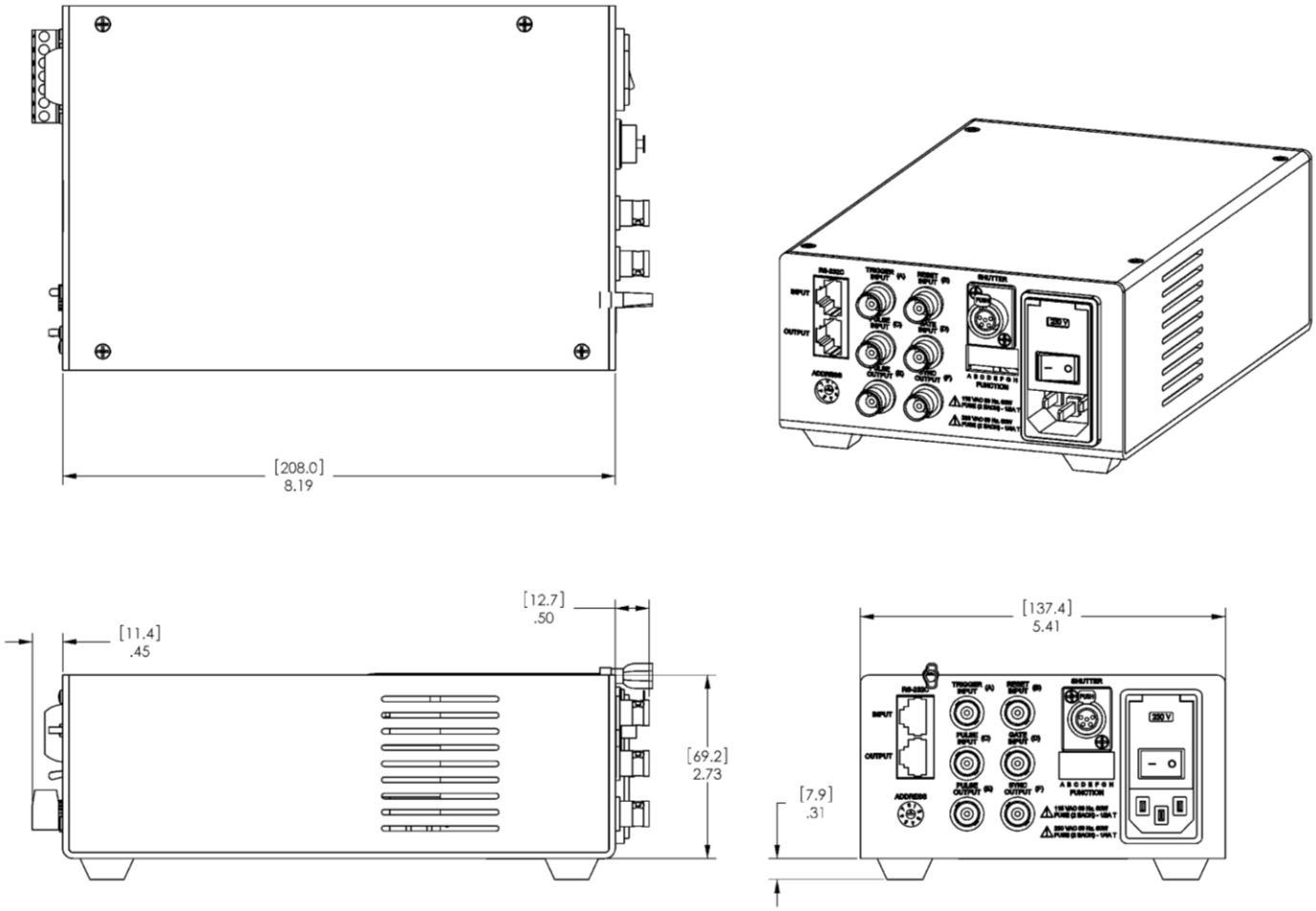



**Figure 8: Overall VCM-D1 Dimensions**

## Maintenance

Proper care and maintenance of the unit should be taken as with any electronic instrument.

With the exception of line and shutter fuse replacement, there are no user-serviceable parts outside or inside of the **VCM-D1**.

There is no service to be performed by the user other than exterior inspection for visible damage of the case and line cord and exterior cleaning.

The only user service that can be performed is **Fuse Replacement** or **Line Voltage Change** procedures.

Although the stability of the drive voltage is checked and calibrated prior to shipment, it may become necessary to make some minor adjustments to the operating systems of the **VCM-D1** over time.

**It is highly recommended that if a problem is suspected that the unit be returned to the factory for checkout, adjustment and calibration. Failure to do this may damage the unit's circuitry and/or functionality**.

## General Care

Perform routine inspection of the **VCM-D1** on a regular basis.

Inspect the outer case for any signs of visible damage.

Pay particular attention to the condition of the AC line cord. If there are any signs of damage or deterioration, replace it immediately with an approved line cord.

Follow the **Inspection and Cleaning** procedures elsewhere in this manual.

## Inspection and Cleaning

### Inspection – Exterior

Inspect the outside of the **VCM-D1** for damage, wear, and missing parts. If the unit appears to have been dropped or shows other signs of exterior damage, it should be checked thoroughly to verify correct operation and performance. If damage is suspected, please return the unit to the factory for repair – there are no user-serviceable parts.

### Cleaning Procedure – Exterior

1. Remove loose dust on the outside of the **VCM-D1** with a lint free cloth.

| | |
|---|---|
| ***CAUTION*** | *To prevent getting moisture inside the unit during external cleaning, use only enough liquid to dampen the cloth or applicator.* |

| | |
|---|---|
| ***PRUDENCE*** | *Lors d'un nettoyage fin , afin d'éviter d'introduire de l'humidité à l'intérieur de l'appareil, n'utilisez que le strict nécessaire de liquide pour humecter le linge ou l'applicateur utilisé pour le nettoyage.* |

2. Remove remaining dirt with a lint free cloth dampened in a general purpose detergent-and-water solution. Do not use abrasive cleaners.

### Inspection – Interior

*Do not attempt to open the case of the* **VCM-D1** *under any circumstances. There are no user-serviceable parts inside the case.*

### Cleaning Procedure – Interior

*Do not attempt to open the case of the* **VCM-D1** *under any circumstances. There are no user-serviceable parts inside the case.*

# Specifications

## System Characteristics

| Name | Description |
|---|---|
| Repeat Exposure | • Minimum 35 msec between exposures for 25 mm and smaller shutters<br>• Minimum 100 msec for 35 mm and larger shutters. |
| | |
| Shutter Drive | • Continuously variable frequency of exposures from DC to the shutter's maximum rate<br>• Maximum peak pulse power: 400 W<br>• Maximum pulse voltage: 70 VDC<br>• Maximum pulse current: 5.7 A (test conditions: standard 5 Volt, 12 ohm coil cycled with 20 ms exposure at 5 Hz). |

## External Input Characteristics

| Name | Description |
|---|---|
| TRIGGER INPUT(BNC)<br>Rear Panel | • Input impedance: 4.7K ohms<br>• Source current: 100 µA<br>• Active-low or active-high selectable with FUNCTION slide-switch A<br>• Minimum pulse width to ensure triggering: 100 µsec<br>• TTL compatible:<br>– Minimum high-level: +2.0 VDC<br>– Maximum low-level: +0.8 VDC<br>• Sink current: 1 µA. |
| | |
| RESET INPUT (BNC)<br>Rear Panel | • Input impedance: 4.7K ohms<br>• Source current 100 µA<br>• Active-low or active-high selectable with FUNCTION slide-switch B<br>• Minimum pulse width to ensure reset 100 µs (5 ms min. for key-switch MODE A or B)<br>• TTL compatible<br>– Minimum high-level +2.0 VDC<br>– Maximum low-level +0.8 VDC<br>• Sink current 1 µA. |
| | |
| PULSE INPUT (BNC)<br>Rear Panel | • Input impedance: 4.7K ohms<br>• Source current: 100 µA<br>• Active-low or active-high selectable with FUNCTION slide-switch C<br>• Minimum pulse width determined by applicable shutter<br>• Maximum pulse width unlimited<br>• TTL compatible<br>– Minimum high-level +2.0 VDC<br>– Maximum low-level +0.8 VDC<br>• Sink current 1 µA. |

## External Input Characteristics (cont'd)

| Name | Description |
|---|---|
| GATE INPUT (BNC)<br>Rear Panel | • Input impedance: 4.7K ohms<br>• Source current: 100 µA<br>• Active-low or active-high selectable with FUNCTION slide-switch D<br>• Minimum pulse width determined by period of signal applied to TRIGGER Input<br>• Maximum pulse width determined by multiple of TRIGGER signal period<br>• TTL compatible:<br>– Minimum high-level: +2.0 VDC<br>– Maximum low-level: +0.8 VDC<br>• Sink current: 1 µA. |
| | |
| Pulse In<br>(CONTROL Pin 2)<br>Front Panel | • Input impedance: 4.7K ohms<br>• Active-high only<br>• Minimum pulse width determined by applicable shutter<br>• Maximum pulse width unlimited<br>• TTL compatible:<br>– Minimum high-level: +2.0 VDC<br>– Maximum low-level: +0.8 VDC<br>• Sink current: 1 µA. |
| | |
| Interlock In<br>(CONTROL Pin 4)<br>Front Panel | • Input impedance: 1K ohms<br>• Active-high only<br>• Minimum input voltage required to activate interlock: +4.6 VDC.<br>• +10 volt DC output of CONTROL Pin 1 can be used as supply voltage for this input. |
| | |
| RS-232C INPUT<br>(Upper RJ45 Jack)<br>Rear Panel | • Baud rate 9600<br>• 8 Data bits<br>• 1 Stop bit<br>• No Parity<br>• No flow control<br>• "Null-Modem" type input<br>• 8 commands available<br>• 1 global address location for commands<br>• 8 local address locations for commands<br>• See **ADDRESS Select** for octal switch settings of local address locations<br>• Command transmission time: 0.94 msec.<br>• See **RS-232C Test Program**. |

## External Input Characteristics (cont'd)

| Name | Description | | | | |
|---|---|---|---|---|---|
| | | | | | |
| RS-232C Commands | Global Address Code Locations | | | | |
| | Decimal | HEX | Octal | Binary | ASCII |
| Open | 64 | 40 | 100 | 01000000 | @ |
| Close | 65 | 41 | 101 | 01000001 | A |
| Trigger | 66 | 42 | 102 | 01000010 | B |
| Reset | 67 | 43 | 103 | 01000011 | C |
| AUX enable | 68 | 44 | 104 | 01000100 | D (Sets AUX 1 low) |
| AUX disable | 69 | 45 | 105 | 01000101 | E (Sets AUX 1 high) |
| Gate On | 70 | 46 | 106 | 01000110 | F |
| Gate Off | 71 | 47 | 107 | 01000111 | G |
| | | | | | |
| GND (CONTROL Pin 3) Front Panel | 0 VDC ground reference provided for CONTROL input pins. | | | | |

## External Output Characteristics

| Name | Description |
|---|---|
| PULSE OUTPUT (BNC)<br>Rear Panel | • Active-low or active-high selectable with FUNCTION slide-switch E<br>• Source impedance: 1K ohms<br>• Maximum source current: 5 mA<br>• Maximum sink current: 128 mA<br>• Maximum low-level: +0.5 VDC<br>• Minimum high-level: +4.5 VDC.<br>• Duration time determined by width of active pulse applied to applicable PULSE Input. |
| | |
| SYNC OUTPUT (BNC)<br>Rear Panel | • Active-low or active-high selectable with FUNCTION slide-switch F<br>• Source impedance: 1K ohms<br>• Maximum source current: 6.8 mA<br>• Maximum sink current: 25 mA<br>• Maximum low-level: +0.5 VDC<br>• Minimum high-level: +4.5 VDC.<br>• This output provided for shutter equipped with electronic synchronization feature. |
| | |
| RS-232C OUTPUT<br>(Lower RJ45 Jack)<br>Rear Panel | • Baud rate: 9600<br>• 8 Data bits<br>• 1 Stop bit<br>• No Parity<br>• No flow control.<br>• This output provided for daisy-chain application of up to 8 VCM-D1 series controllers. |
| | |
| AUX Out<br>(CONTROL Pin 6)<br>Front Panel | • Active-low only<br>• Source impedance: 1K ohms<br>• Maximum source current: 5 mA<br>• Maximum sink current: 128 mA<br>• Maximum (low-level) output voltage: +0.5 VDC<br>• Activated by RS-232C commands "AUX enable" and "AUX disable". |

## External Output Characteristics (cont'd)

| Name | Description |
|---|---|
| Interlock Out<br>(CONTROL Pin 5)<br>Front Panel | • Active-high only<br>• Source impedance: 1.3K ohms<br>• Maximum source current: 7.2 mA<br>• Maximum sink current: 25 mA<br>• Maximum (high-level) output voltage: +5 VDC.<br>• This output goes high whenever DISABLED LED illuminates. |
| | |
| +10V<br>(CONTROL Pin 1)<br>Front Panel | • 10 volt DC<br>• 50 mA<br>• Unregulated output provided for use in remote switching and/or control circuits;<br>• Internal fuse protection. |
| | |
| +5V<br>(CONTROL Pin 7)<br>Front Panel | • 5 volt DC<br>• 50 mA<br>• Regulated output provided for use in remote switching and/or control circuits<br>• Internal fuse protection. |
| | |
| GND<br>(CONTROL Pin 3)<br>Front Panel | 0 VDC ground reference provided for CONTROL output pins. |

## General Characteristics

| Name | Description |
|---|---|
| POWER Indicator<br>Front Panel | • Green 3mm LED indicates when power is present. |
| | |
| DRIVER Indicator<br>Front Panel | • Green 3mm LED indicates when the shutter driver circuit is active.<br>• Will illuminate with or without the load of a shutter's actuator coil. |
| | |
| SYNC Indicator<br>Front Panel | • Green 3mm LED indicates when a shutter's electronic synchronization feature is active.<br>• SYNC OUTPUT (BNC) is active only when this LED is illuminated. |
| | |
| DISABLED Indicator<br>Front Panel | • Red 3mm LED indicates when interruption of AC (Mode A) or DC (Mode B) supply voltage is detected.<br>• Shutter driver will be disabled and "Interlock Out" will be set high when this LED is illuminated. |
| **Name** | **Description** |
| ADDRESS Select<br>Rear Panel | • 8-position octal switch allows selection of individual (local) address locations of commands sent by a computer's serial port<br>• Can be used for daisy-chain application from one computer serial port. |
| | |
| RS-232C Commands | ADDRESS Switch Locations (x = don't care) |
| | x 0 1 2 3 4 5 6 7 |
| Open | 64 128 144 160 176 192 208 224 240 (Decimal) |
| Close | 65 129 145 161 177 193 209 225 241 (Decimal) |
| Trigger | 66 130 146 162 178 194 210 226 242 (Decimal) |
| Reset | 67 131 147 163 179 195 211 227 243 (Decimal) |
| AUX enable | 68 132 148 164 180 196 212 228 244 (Decimal) |
| AUX disable | 69 133 149 165 181 197 213 229 245 (Decimal) |
| Gate On | 70 134 150 166 182 198 214 230 246 (Decimal) |
| Gate Off | 71 135 151 167 183 199 215 231 247 (Decimal) |
| | |
| FUNCTION Select<br>Rear Panel | • Slide-switches A, B, C, D, E and F allow selection of active-low or active-high states for the six BNC inputs and outputs<br>• Slide-switch G disables the synchronization feature of a shutter<br>• Slide-switch H allows the selection of additional pulse energy for 35 mm and larger aperture shutters. |

## General Characteristics (cont'd)

| Name | Description | | |
|---|---|---|---|
| | | Position | |
| Function | Slide Switch | Lower | Upper |
| TRIGGER INPUT | A | active-low | active-high |
| RESET INPUT | B | active-low | active-high |
| PULSE INPUT | C | active-low | active-high |
| GATE INPUT | D | active-low | active-high |
| PULSE OUTPUT | E | active-low | active-high |
| SYNC OUTPUT | F | active-low | active-high |
| SYNC Feature | G | enabled | disabled |
| Pulse Energy | H | 25mm & smaller | 35mm & larger |
| | | | |
| Power Requirements | • 115 VAC ±5%, 60 Hz or 230 VAC ±5%, 50 Hz; 60 Watts<br>• Line voltage selected manually by rotating the fuse-holder of AC power-entry module<br>• See **Voltage Change** procedure. | | |
| | | | |
| Fuse Requirements | • Two ½ Amp "T" slow blow (3AG ¼ x 1¼") for 115 VAC line<br>• Two ¼ Amp "T" slow blow (3AG ¼ x 1¼") for 230 VAC line<br>• One 0.6 Amp "T" slow blow (5 x 20mm) for Shutter coil<br>• See **Line Fuse Replacement** instructions for AC power fuse change | | |
| | | | |
| Operating Temperature | +5° C to +40° C (+41° F to +104° F) | | |
| | | | |
| Storage Temperature | -20° C to 55° C (-4° F to 131° F) | | |
| | | | |
| Size (HWD) | 2.73in x 5.41in x 8.18in (69.3mm x 137.4mm x 207.8mm) | | |
| | | | |
| Weight | 3.50 lbs (1.59 kg) | | |
| | | | |
| Relative Humidity | 80% at a 31° C (88° F) ambient, decreasing linearly to 50% at 40° C (104° F). | | |
| | | | |
| Altitude | Up to 2000 m (6,562 ft), Indoor use | | |
| | | | |
| Pollution | Degree 2 | | |
| | | | |
| Overvoltage | Category II | | |
| | | | |

## General Characteristics (cont'd)

| Name | Description |
|---|---|
| Supplied Accessories | • AC line cord, IEC type<br>• Proper line cords for domestic (USA) and Overseas (EU) are included.<br>• If the included EU line cord is not compatible, use a line cord rated 230 VAC, 1A minimum, 0.75 $mm^2$ conductor size, minimum.<br>• The maximum cord length is 3 meters.<br>• Model **710A** shutter interconnect cable (3 meters)<br>• Two 230 VAC line fuses, ¼ Amp "T" slow blow (3AG ¼ x 1¼") When configured for Overseas (EU).<br>• Two 115 VAC line fuses, ½ Amp "T" slow blow (3AG ¼ x 1¼") When configured for Domestic (USA).<br>• Two Keys for MODE key-switch<br>• User Manual<br>• Checklist |
| | |
| Optional Accessories | • Model **710R** remote hand-held trigger cable.<br>• Model **710R/F** remote foot-switch trigger cable.<br>• Model **810RJ** RS-232C interconnect serial cable with RJ45 connections (includes 910RJF adapter).<br>• Model **910RJF** female DB9 to RJ45 adapter for use with 810RJ and PC.<br>• Model **910RJM** male DB9 to RJ45 adapter for use with 810RJ & VMM type driver.<br>• Model **810RS** RS-232C/RS-422 interconnect serial cable for use with MAC with DIN-8 .<br>• Model **701A-S5** shutter adapter cable which connects between the 510A and 7-pin WPI connector of the shutter.<br>• Model **510A** Shutter interconnect cable (5-pin SWC male to 5-pin SWC female). |

## Applicable Certifications

| The VCM-D1 has successfully completed and is compliant with the following tests performed at MET Laboratories, Inc. | |
|---|---|
| Safety Certification UL/CSA/CE | • Application of Council Directive(s): EMC 89/336/EEC as amended by 93/68/EEC Standards to which Conformity is Declared: 61326:1997 + A1:1998 + A2:2002 + A3:2003 Class A/B<br>• UL61010A-1 First Edition Electrical Equipment for Laboratory Use Part 1: General Requirements, Rev. December 6, 2002<br>• CSA C22.2 N0 1010-1 First Edition Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use Part 1: General Requirements, Rev. 1999 |
| EMC Certification – CE | • EN 61326-1: 2006 – Electrical Equipment for Measurement, Control, and Laboratory Use. |
| | • EMC Requirements:<br>– EN 61000-4-2:1995 + A1:1998 + A2:2002 – Electrostatic Discharge Immunity<br>– EN 61000-4-3:2006 – Radiated Electromagnetic Field Immunity<br>– EN 61000-4-4:2004 – Electrical Fast Transient/Burst Immunity<br>– EN 61000-4-5:2005 – Surge Immunity<br>– EN 61000-4-6:2003 + A1:2003 +A2:2005 – Conducted Radio- Frequency Immunity<br>– EN 61000-4-11:1994 – Voltage Dips and Interruptions<br>– CISPR 16-2-3:2003 – Radiated Emissions – Class A<br>– CISPR 16-2-1:2003 – Conducted Emissions – Class A |

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